

Application No.: 10/565,994

Docket No.: JCLA19238

REMARKS**Present Status of the Application**

Claims 1-6 are rejected. Specifically, claims 1, 2, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Semura (U. S. Patent 5,696,860) in view of Kondo (JP 2002-162211). In addition, claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Semura in view of Kondo. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Semura in view of Kondo and further in view of Seike (U. S. Patent 5,367,591). Applicant has amended independent claim 1 and added claim 7-9. After entry of amendments, claims 1-9 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Discussion of Claim Rejections under 35 USC 103

Claims 1, 2, and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Semura in view of Kondo. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Semura in view of Kondo. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Semura in view of Kondo and further in view of Seike. Applicant respectfully traverses the rejections for at least the reasons set forth below.

1. In the present invention with respect to independent claim 1 and the newly added claims 7-9, as for example shown in FIGs. 1-3, basically includes the following features.

a. As described in specification, the tube receiving portion 3a is a protruding portion from the fixing piece 3, as an integrated assembly. As a result, the fixing piece 3 with the tube

Application No.: 10/565,994

Docket No.: JCLA19238

receiving portion 3a is kept in secure during manipulation. In the operation, the initial value of the tension of the sensor can be maintained during manipulation. The prior art references do not disclose, teach, or suggest on maintaining the tension in consideration, as to be further discussed later.

Further, as described in 3rd paragraph of page 4, the fastening member 4 engaged to the upper portion of the tube 2 is removed after the fixing piece 3 is secured to the object to be measured. This is to sensitively transfer the strain of the object to the FBG sensor S. The prior art references do not disclose, teach or suggest such function of the fixer for precise measurement, as to be further discussed later.

b. The tube 2 enclosing the fiber bragg grating sensor S is disposed between the pair of fixing pieces 3, such that both ends of the tube 2 are detachably secured to each of the tube receiving portions 3a of the fixing pieces 3 by a fastening member 4. In other words, the tube 2 is not secured onto the surface of the object to be measured.

As recited in newly added claim 8, actually, the pieces 3 are fixed to the surface of the substrate but not the tube 2. In this way the change of surface stain of the object can be measured.

As recited in newly added claim 9, the fastening member 4 does not expand or contact the fiber bragg grating sensor S.

Normally, FBG sensor is tolerant of longitudinal tension but weak in rotation, twist or bend. But, in re Kondo, the FBG sensor is set by screw mechanism with the screw part 16 such that the sensor is given twisting force from the manipulation, which deteriorates durability.

Application No.: 10/565,994

Docket No.: JCLA19238

2. In re Semura (see Fig. 2), in addition to the previous arguments, the optical device is to branch the one input signal into 4 output signals by 1 x 4 -branch optical waveguide 12. The Office Action has referred to a pair of fixing pieces (Fig 2 [26,33]) in Semura. Applicant cannot find the element of 33, which is referred. Applicant assumed that the piece 32 is referred. Basically, the pair of fixing pieces (Fig 2 [26, 32]) has no groove at all.

Further, as can be seen in Fig. 3, the fibers on both sides are secured to the waveguide substrate 10 by the adhesive. In operation mechanism, since the Semura is to branch one input signal into 4 output signal, the waveguide substrate 10 should be firmly fixed between the fixing pieces (Fig 2 [26, 32]), in order to have the stable output signals. Therefore, the waveguide substrate 10 not detachably fixed. The fixing pieces (Fig 2 [26, 32]) are not fixed to a surface of an object to measure, i.e., the strain change.

Even further, there is no a detachable fastening member disclosed at all.

3. In re Kondo, it should be noted that the protection tube 10 is adhered and fixed on the surface of the object to be measured (Abstract; Fig. 16). Both ends of the sensor 11 have the screw part 16.

Even further, the pieces (13a, 13b) are considered by the Office Action as the fastening member of the present invention. Applicant respectfully disagrees.

In Fig. 6 of Kondo, the screws 13c is to secure the pieces 13a and 13b to form the supporting piece 13, which is engaged with the screw part 16 by screw mechanism. The optical fiber for the sensor 11 is expanded and contracted by rotating the optical fiber for the sensor 11, due to the screw part 16. The pieces (13a, 13b) are not detachable during operation. In addition to it, in re Kondo, due to the tolerance of screw thread, longitudinal tension or

Application No.: 10/565,994

Docket No.: JCLA19238

compressive force is caused on the sensor when the protection tube 10 is fixed on the object by the pieces 13a and 13b. The pieces 13a and 13b indeed increases difficulties in precise setting. Further, the rather complex structure of Kondo's makes it vulnerable to various environmental factors such that reliability of measurement is worse. Kondo does not disclose the detachable fastening member of the present invention due to different structure and different mechanism.

Even further, Fig. 18 shows that the protection tube 10 indeed adhered to the surface of the object because the protection tube 10 is bent, being conformal to the bended surface. In the present invention the tube 2 is not directly fixed to the surface of the object.

4. With respect to claim 3 (see Fig. 2), the threaded hole 3d is formed on an upper portion of the tube receiving portion 3a, and a fastening member 4 is threadedly engaged with the threaded hole 3d for selectively compressing and fastening the tube 2. In Kondo, the screw part 16 is fixed at both ends of the tube 10 but not from the side. Kondo does not disclose the features recited in claim 3.

Kondo is also functioning in different structure and mechanism from the present invention.

5. With respect to claim 5, the fixing piece 3 is detachably secured to the fixing plate 7 of the object by a fastening member 5. However, in Kondo, the protection tube 10 is indeed adhered and fixed on the surface of the object S to be measured while the screw part 16 is fixed at both ends of the tube 10 but not from the side.

The present invention allows the user to easily install the FBG sensor just by fixing it to the fixing plate 7 of an object to be measured, and releasing the fastening member 4 afterward. Further to it, the instant invention doesn't need additional setting work in the field.

Application No.: 10/565,994

Docket No.: JCLA19238

6. With respect to claim 6, Seike is further cited in combination. However, claim 6 is depending on claim 1. Seike does not provide the missing features of Semura and Kondo in claim 1 as discussed above. Therefore, even if Seike in combination with Semura and Kondo is made, the features recited in claim 6 are not disclosed by prior art.

7. The Office Action in "*Response to Argument*" states that "... if one would apply the tube modification of Kondo to the device of Semura;....". Applicant respectfully disagrees for at least the reasons set forth above.

For at least the foregoing reasons, Applicant respectfully submits that independent claim 1 patently defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 2-9 patently define over the prior art references as well, wherein claims 7-9 further define over the prior art references.

Application No.: 10/565,994

Docket No.: JCLA19238

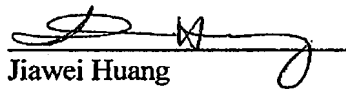
CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 1-9 of the invention patently define over the prior art and are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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